EE 464

Homework 4

Due Wednesday March 5, 2003

Work all 10 problems.

Problem 1. Leon-Garcia Ch.3 problem 20.

Problem 2. Leon-Garcia Ch.3 problem 21.

Problem 3. Leon-Garcia Ch.3 problem 32.

Problem 4. Leon-Garcia Ch.3 problem 34.

Problem 5. Leon-Garcia Ch.3 problem 45.

Problem 6. Suppose the random variable X has *pdf*

$$f(x) = 20x^3(1-x),\ 0 < x < 1.$$

a. Show this is a valid *pdf*.

b. Find the distribution function $F(x)$.

c. Evaluate $P(X \leq 2/3)$.

d. Find $P\left(X < \frac{2}{3} \middle| \frac{1}{4} < X < \frac{3}{4}\right)$.

Problem 7. The diameter on an electric cable, say X, is assumed to be a continuous random variable with *pdf*

$$f(x) = 6x(1-x),\ 0 \leq x \leq 1.$$

a. Show this is a valid *pdf* and sketch it.

b. Find the distribution function $F(x)$ and sketch it.

c. Determine a number b such that $P(X < b) = 2P(X > b)$.

Problem 8. The continuous random variable X has *pdf*

$$f(x) = \begin{cases} 3e^{-3x}, & x > 0 \\ 0, & \text{elsewhere.} \end{cases}$$

a. Find $P(X \leq 2)$.

b. Find $P(X \leq 2 | X > 1)$.

Problem 9. A coin is flipped and if the result is a head the random variable Y is formed by choosing a number uniformly in the interval [0, 1], i.e., $Y \sim U[0,\ 1]$. If the result is a tail then the random variable Y is formed by choosing a number uniformly in the interval [0, 2], i.e., $Y \sim U[0,\ 2]$.

Find $P\left(Y \leq \frac{2}{3}\right)$.